

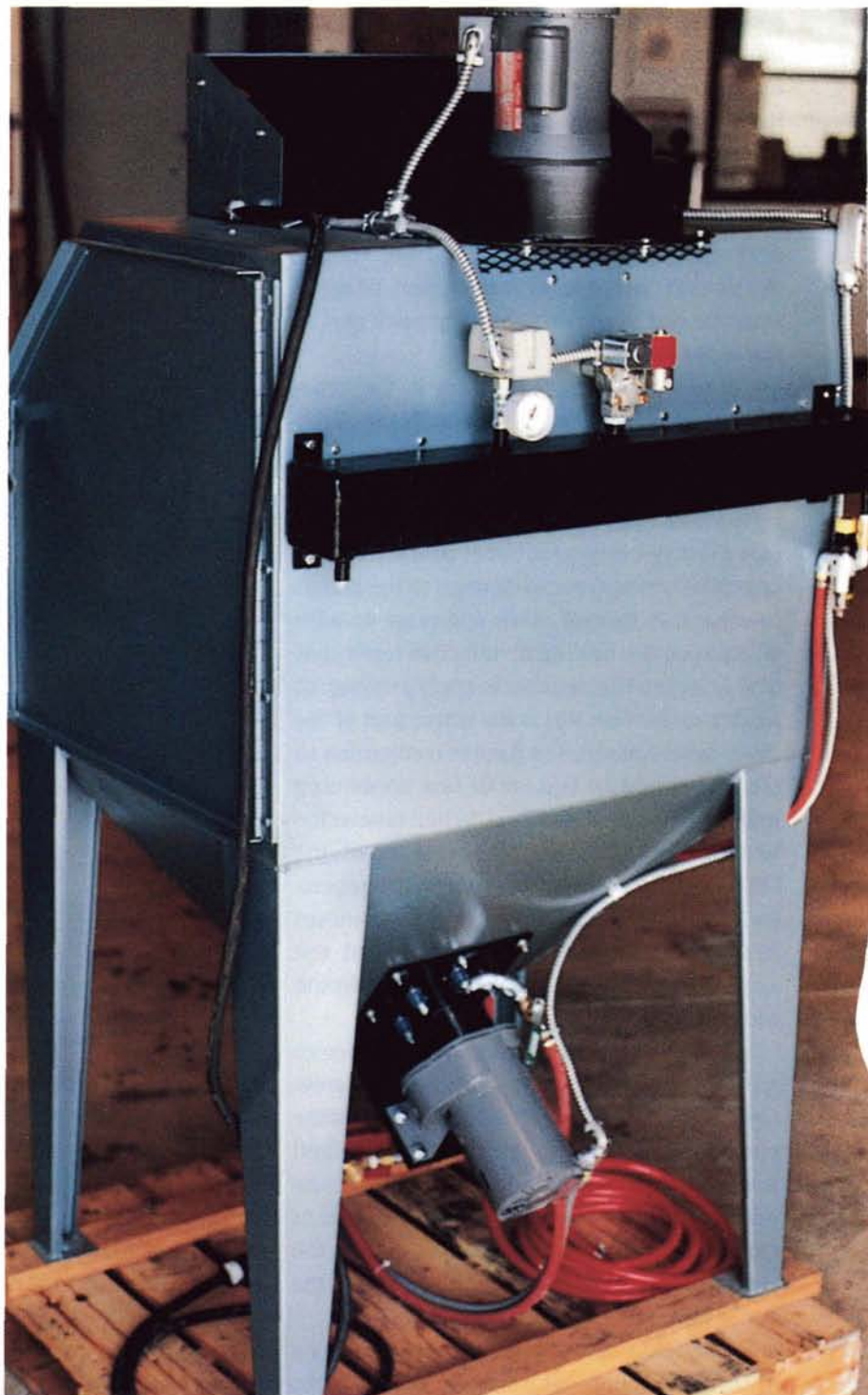
## **Lubricant Coating Process**

NASA and its contractors employ a wide variety of materials to reduce wear and sustain lubrication for aerospace vehicles operating in harsh environments. One such is molybdenum disulfide, a slippery gray-black powder used as a lubricant and a lubricant additive.

This material's unusual characteristics allow it to maintain lubricating ability at temperatures ranging from far below zero to more than 750 degrees Fahrenheit. Additionally, "moly" performs well under vacuum conditions and is only minimally affected by high radiation levels, hence has found extensive application in space systems. Moly is also in widespread use in non-aerospace industries, particularly in the automotive, railroad, airline, metal fabricating and petroleum products industries.

Like most solid lubricants, moly has a drawback: it must be perfectly bonded to a surface so that it does not "migrate" away from highly loaded contact areas or lose strength at elevated temperatures. To overcome that drawback, NASA developed a "peen plating" process for applying moly. Peening involves bombarding a surface with a high velocity stream of small shot, which act like thousands of tiny ball peen hammers pounding the surface. The pounding creates many microscopic surface indentations, thus forming tiny pockets of lubrication that prevent lubricant migration and promote high energy bonding; it also increases fatigue strength of the peened part and reduces stress corrosion.

This technology is now being employed under NASA license by Techniblast, Seminole, Oklahoma as the key element of the company's SURFGUARD process for applying high strength solid lubricants. Techniblast was assisted during the licensing process by Rural Enterprises, Inc., Durant, Oklahoma, a NASA application team.





Solid lubrication coatings are usually applied only in service centers due to process restraints. But Techniblast believes that most customers would prefer to have their own in-house coating capabilities, so Techniblast is extending the technology to include new equipment that can readily be used by industrial firms in their own facilities.

The SURFGUARD process requires two machines—one for cleaning and one for coating. The cleaning step is necessary so that the coating is bonded directly to the substrate to provide a better “anchor” for the coating. The coating machine, designed to handle moly and other powdered lubricants, applies a coating half a micron thick. A blast gun, which can use various pressures to vary peening intensities for different applications, fires high velocity “media”—the peening hammers—ranging from plastic pellets to steel shot.

At left is a Techniblast-developed prototype coating machine. At top is an interior view of the machine showing a filtering unit that recaptures the airborne powder for reuse. At right is the coating nozzle. The lower photos are views of an aluminum die cast mold before (right) and after application of SURFGUARD. While developing SURFGUARD equipment for in-house use by customers, Techniblast is also offering coating service performed at its own facility.

